

Trees *on the* Land

Green Economy Foundation
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European Innovation Partnership (EIP) Project

A Practical Silvoarable Demonstration and Research Project for Ireland
Showcasing the benefits for biodiversity, carbon sequestration, soils, water quality, nutrient cycling, farm productivity and income, and the farming community.

July 2021 - May 2023



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A Definition of Agroforestry:

Agroforestry is a land use and management system where trees are grown on pasture (silvo-pastoral) or arable land (silvo-arable) or horticultural land (silvo-horticulture) amongst or around livestock and crops. Crops or livestock enterprises are combined with trees on the same land with minimum impact on productive acreage. This is in contrast to many modern farming and forestry systems which have been trees removed from agricultural land to maximise the productive area or where agriculture has ceased and land is turned over to permanent forestry.

Agroforestry can be very simple, a handful of trees scattered across farmland or added hedgerows and shelter belts. Other systems are more complex with rows, lines, belts or grids of trees planted at low density over large areas.

Executive Summary:

This project was put together to create silvoarable trials and demonstrations at three tillage farms in Ireland. The aim is to establish a flagship project for the farming community and other stakeholders to visit and learn about silvoarable agroforestry and to demonstrate the multiple benefits to biodiversity, farm sustainability, productivity and the wider landscape.

At the time of writing the EIP application (April 2021), there was no formal financial or practical support for silvoarable work on Irish farms and correspondingly little practical knowledge or experience in the sector to draw from. With almost 8% of Irish farmland under tillage and a high chance of an increase to this area in the near future, there is significant scope for silvoarable agroforestry to play a key role in achieving sustainability targets for farming in Ireland.

The project will take in diverse agroforestry systems from traditional hedgerows, shelter belts, soakage belts and field trees through to more complex grid, matrix and alley systems with the aim of showing specific benefits to farm biodiversity, carbon sequestration, soil quality, efficient nutrient cycling, water quality, farm productivity and diversity of income streams.

The project will design and establish the three farm projects, collect baseline data, and put in place opportunities for farm walks and visits as a learning resource for farmers and stakeholders.

When the EIP project ends, Trees on the Land will undertake to support long term management of the agroforestry in collaboration with the farmers, further tree planting as projects develop, ongoing data collection and monitoring, and access for farmers and other stakeholders.

The impacts of adding trees to farmland in terms of possible loss of single farm payments will be discussed in detail with each farm so that where losing a farm payment is not an option for the farmer, designs will ensure that all planting fits with and doesn't jeopardise future payments.

Farms will not receive any additional payments for taking part in the EIP project, however all establishment costs will be covered by the funding and we will work to ensure that basic farm payments are maintained on planted land as far as possible.

Trees on the Land will work with three tillage farmers who are passionate about farm sustainability and forward thinking farming systems. The project will suit farmers with a keen interest in farm tree planting and/or agroforestry alongside maintaining a productive commercial tillage operation.

Introductory Comments:

Structure:

The short timeframe of this project means that, rather than a more typical EIP research project, this project will not yield 'results' as such. It has three key aims - (1) Design and plant silvoarable systems at three tillage farm sites. (2) Collect baseline data. (3) Begin a series of farm walks for stakeholders.

Beyond the EIP project itself, Trees on the Land plans to - (4) Continue to develop the planting work at each project farm, including restocking failed trees, supporting maintenance and management work, and adding further tree planting as appropriate to each project. (5) Collect further data to observe impacts of the trees on the original baseline data. (6) To continue to run farm walks and visits for stakeholders.

Loss of Productivity:

Agroforestry in Ireland is a novel concept, viewed with a certain amount of suspicion amongst tillage farmers because it is associated with an eventual reduction in productivity on the arable ground. Farmers have spent generations removing trees, hedges and other tree cover from productive land, even those who are keen to explore the possibilities of agroforestry may stop short of actually letting the trees march all over prime cropland.

We feel it is incredibly important that the definition of agroforestry is kept very broad - whether planting densities reach 1,000 stems per hectare or just one or two trees, they all count as agroforestry. We aim to explore many styles of tree planting with this project, seeking to show that with careful design and management of silvoarable planting, it is quite possible to create systems that do not reduce yields and indeed can bring an increase in productivity.

Paying Farms:

In designing the EIP project, we decided not to offer any payment to farms for taking part. We felt that offering a payment would potentially cause administrative confusion for farms and we preferred farmers to join the EIP motivated by a wish to add trees to their land, rather than because of any financial incentive. We covered all establishment costs associated with the trees, inter alia, design, consultancy and planning, ground preparation, planting labour, tree purchase and delivery, weeding and general maintenance support, restocking, tree protection and all of the baseline data collection.

Tree Species Selection & Sourcing Trees:

Trees on the Land has always been committed to its focus on native trees, grown in Ireland and from Irish seed. Ireland's native woodlands, hedgerows, copses and other native tree cover are incredibly important and ought to be protected and expanded wherever possible.

However, with the joint threats of a changing climate and pressures from pests and diseases, we keep an open mind about using a diversity of species (native, naturalised and non native), for agroforestry work, to bring resilience in changing conditions. Pests and diseases have severely damaged populations of some native species and climate change may impact which species can grow and thrive in Ireland in future.

Agroforestry provides a unique opportunity for super-diverse designs bringing many benefits. For this project we aimed to source as many trees as possible grown in Ireland from Irish seed, but to buy imported trees where necessary to complete the designs.

Open Grown Trees - From seed to sawlog:

Currently the majority of trees sold by nurseries are for either the forestry industry (small 1 or 2 year old forestry grade whips), or for the landscaping and garden industry (larger trees often formatively pruned for an attractive spread of branches). Forestry planting relies on many trees planted together to draw each other up towards the light and will generally yield some good straight trees as those poorer specimens are thinned out. The focus is on economy of scale - plant a thousand and keep a hundred. Garden and landscaping planting requires a small number of good-looking trees that already look like trees when they are planted.

Agroforestry needs something in between - a young tree of excellent form, two or three years old, ideally a maiden with one straight leader, strong healthy roots, and able to cope with planting into open and often somewhat hostile conditions. There are plenty of opportunities for using groups and belts of trees and nurses to mimic a forestry situation, and there is a lot that can be done by carefully pruning less than perfect trees. But where individual trees are to be truly open grown, it is nearly impossible to find the right sort of stock to start the process.

Producing high quality timber trees is often not the only objective when creating a new agroforestry system, but it is an important one, and we have a lot to learn about open-grown timber in Ireland. Modern tree planting relies heavily on staking and guarding trees, but whether these help or hinder good form is open to debate. We have tried to avoid any staking or guarding with the exception of a few lightweight rabbit spirals on the more valuable trees in Project 1. Trees will be carefully pruned for best form as appropriate to their setting and we hope that they will respond well and show timber potential.

Farm Payments & Land Classification:

Although tree planting through the DAFM afforestation or agroforestry schemes no longer leads to a loss of farm payments on the land, and other national farm schemes such as GLAS, REPS, AEOS, ACRES etc. do not remove payments, planting new trees onto farmland independently can still lead to a loss of payments.

If agroforestry canopy cover reaches 20% of a field parcel area at maturity, or if any planted areas are 0.1 Ha or over in one block, or if 400 stems or more per hectare are planted, the land will be changed from an agricultural classification over to a forestry classification and become permanent forest land, even if it is still used for all of the same agricultural activities. If the DAFM agroforestry schemes are used, farm payments stay in place along with grant premium payments. If trees are planted independently, farm payments may be lost.

Hedgerows, shelterbelts and areas of naturally formed woodland or scrub are allowable to a certain extent and are not included in these thresholds. Sensibly planted, an ordinary hedge or shelter belt will not compromise farm payments and will not lead to classification of the land as forestry.

Forest land is worth considerably less than good tillage land; losing the agricultural classification means that should a landowner wish to sell the land or to borrow against it at the bank, forested lands would be very much less valuable than tillage. This re-designation is a serious problem for farms

looking at agroforestry work, whether it is funded by DAFM or by other pathways. Most farmers are not willing to risk the value of their land by planting trees through these schemes, even if they are otherwise convinced of the benefits.

We appreciate that without the forestry designation, DAFM funded agroforestry cannot currently be counted towards national forest cover targets. There must also be some reasonable protection of the trees so that when premium payments and contracts with DAFM end, the trees are protected under the Forestry Act and cannot be removed without appropriate licences.

All of the three farm projects wanted their land to remain under an agricultural classification. The key aim with the project was to design planting that suited the various objectives of each farm - none of the designs got close to reaching the thresholds described above and so we did not need to make any major adjustments in design to ensure that land designations stayed in agriculture.

Research Visits - Cambridgeshire, Suffolk, Essex, Buckinghamshire:

Our small team for the EIP have wide experience with establishing trees on farms, as both agroforestry and more traditional tree cover. However we felt that it was worth looking at as many silvoarable systems as possible to help inform design of the Irish projects.

Mark and Imogen visited East Anglia in August 2021 to look at five silvoarable systems, travelling to Cambridgeshire, Suffolk, Essex and Buckinghamshire.

Stephen Briggs - Whitehall Farm, Farcet, Peterborough, Cambridgeshire.

Stephen Briggs is a soil scientist and organic farmer, well known in agroforestry circles for his bold move in 2009 to plant the most extensive commercial silvoarable agroforestry in the UK on his 230 Ha organic farm in Cambridgeshire. He gave generously of his time and expertise when we visited him at the farm.

He grows organic cereals and occasional crops of vegetables on the land, with a silvoarable alley system of apple trees set in rows at 27m centres leaving 24m alleys between the trees. The rows are set on a south west to north east orientation and following the boundaries and drains of the original field structure.

Alleys in general need widths that are multiples of 12m to accommodate modern machinery with a usual reach of 12m in one pass. The tree lines themselves need to be wide enough to allow for the trees themselves and some width of root and canopy, typically 3m minimum and 6m for double or triple rows or to fit in diverse layers of trees and bushes. As we saw at later visits below, 12m is really too tight if the tree rows themselves are also tight.

His initial aim and motivation for adding the trees was to slow the wind speed close to the ground to protect his light peat soils from wind erosion which is a serious problem for farmers in the fens. The tree lines are very uniform being all of one species, although there are several varieties of apples which can be mixed in the juicing process. This supports reliability where some years certain varieties will do better than others, and even in poor years there is a good enough crop to send for juicing.



Apple tree rows with alleys growing organic oats - Whitehall Farm, Cambridgeshire.

Biodiversity support is excellent along the tree lines, especially in an area with very few trees. The trees themselves provide great pollinator support in the spring when they are in blossom and fallen apples are an autumn and winter source of food for birds, insects and small mammals. The strips of ground below the trees, once sown with wildflowers when the trees were first planted, is now a fallow strip of grasses and wildflowers providing a further layer of diverse habitat.

Stephen talked about 3D farming or vertical farming. The trees are utilising vertical space above the ground and also below the ground through deeper root systems than any regular arable crops. They bring up nutrients from deep in the soil and drop leaf litter and small brashy material back onto the fields which rot down and help support soil structure, soil biodiversity and fertility. Rather than thinking of the strips of land as having been taken out of arable production, they are instead yielding a perennial crop rather than an annual crop..

In focusing on one species and one type of harvest with the trees, Stephen aimed to make a commercial enterprise of the apples. He noted that it is easy to end up with multiple crops from many species of trees and a lot of work harvesting them and a risk of very little associated income or profit for the farm. His apples are reliable and simple; they can be harvested after the main cereal harvest is finished, giving easy access across the stubble for pickers and transport for the apples; they go straight off for juicing which is again a reliable way to add huge value to the apple crop and ensure that it is bringing a profit to the farm.

David Wolfe - Wakelyns, Fressingfield, Suffolk.

Wakelyns is a 23 Ha farm bought by Martin and Ann Wolfe in 1992 and run as a very diverse organic arable and horticulture enterprise with early agroforestry planted in 1994. It is one of the very earliest silvoarable projects in the UK. Now run by David Wolfe, who kindly hosted us for the visit, the farm is an inspirational model for diverse organic agroforestry systems, community supported agriculture and short food chain models.

Our visit to Wakelyns provided a complete contrast to Whitehall Farm, with its silvoarable alley systems accommodating a great diversity of trees and crops. The trees are a mixture of rows planted with timber trees; ash, oak, cherry, Italian alder, hornbeam, small leaved lime and sycamore, further

rows are planted with apple trees, others with short rotation coppice of hazel and willow and some wider spaced rows with diverse fruit and nut trees; apple, pear, plum, cherry, peach, apricot, quince, hazel and walnut. The alleys are used to grow cereals and other arable crops, vegetables and herbs, with a rotation leaving alleys fallow under grasses and legumes, which are topped or ploughed in to improve soil fertility and structure.



Diverse timber tree rows with fertility building fallow grass ley between - Wakelyns, Suffolk.

Most of the tree rows are set on 12m centres giving alleys of 10m and set north south. Some of the later planting has wider alleys of about 20m with wider spaced trees. These alleys are now almost too small to accommodate modern farm machinery and although shade, moisture and nutrient competition with alley crops in these close rows is not a notable issue, the rows would be too close for most farms with big machinery.



Willow coppice tree rows with organic wheat growing in the alleys - Wakelyns, Suffolk.

The biodiversity benefits are clear; the farm is alive with birds, insects and other wildlife in dramatic contrast to the open landscape of large conventional arable farms all around.

Making the farm economically sustainable has seen a wealth of small projects come to Wakelyns and thrive. Rather than reducing numbers of people on the farm, as is typical of many modern conventional farms, Wakelyns has become a community of enterprises with many groups and individuals working to make good of the diverse system. There is a bakery making bread for the local community; the grain is grown and milled into flour on the farm, there are community fruit and vegetable schemes, and non food projects - basket making and hemp fibre fabric production.

Professor Steve Newman - Wet Lane, Boxted, Essex.

Prof. Newman very kindly agreed to show us this project on private land in Boxted, Essex, which has mature walnut trees, originally planted as a silvoarable alley system, as well as a set of fascinating walnut trials of trees planted in 1935 as part of a project to rejuvenate production of English walnuts.

Walnuts are a very valuable crop, selling for up to €30 or €40 per kilo for wet walnuts and €20 to €30 per kilo for green walnuts. Even in a poor year, a few kilos from a number of trees will make the harvest worth collecting, especially as there is no processing needed; the nuts can be bagged and sold straight from the field. A good tree can produce up to and over 100 kilos of walnuts in a good year - well worth giving up a few square metres of ground.

The walnut fruit seasons are short and intense - late May to July and often only a two or three week window for green walnuts, and then another short window, again often only two weeks, between late September and early November depending on the variety, year and location for wet walnuts. Walnut timber is also much sought after and good trees are very valuable as sawlogs and even more so if they are good enough to produce veneer. These trees at Boxted were all fruiting varieties and mostly grafted rather than seed grown as would be more typical of timber trees. However, even these trees are valuable for timber and we talked a lot about the huge scope for walnut in the UK and Ireland as a multipurpose tree, especially if both seed grown and grafted trees are included in planting designs.



Walnut trials - Boxted, Essex.

The younger walnut trees look now like a fairly traditional orchard layout, planted at 10m centres. The field was originally under tillage when the trees were planted in the 1980s with trials of many varieties included. As the trees have matured, and partly on account of their being goblet pruned and encouraged to produce a spreading and open framework of branches, the canopy has closed over the rows making access by machinery impossible for arable operations. The field was put back to pasture when the trees began to interfere with the arable work and is now grazed by cattle.

The older 1935 trees are wonderful; what remains of the original planting is a scattering of very large trees over cattle pasture and a fragmented but magnificent avenue. They are old East Anglian varieties including Stutton, Bardwell, Stowlangtoft and Champion of Ixworth.

The nuts are harvested each year by a young neighbouring farmer Jenny Taylor, and sold through the family farm shop along with grass fed beef, free range eggs and jams and preserves.



Walnut trees planted in 1935 - Boxted, Essex.

Professor Steve Newman - Claydon Estate, Middle Claydon, Buckinghamshire.

Prof. Newman brought us to the Claydon Estate on the second day of our tour with him. He had worked to design a number of agroforestry trials in the 1980s on the land. These include an ash silvopasture trial with trees set at 10m and 5m spacings, a poplar and hazel silvopasture trial and another walnut trial.

The poplar and hazel trial was planted with alternate rows of poplar and productive hazelnut varieties on 12m centres. These have grown strongly and the poplar got away and has grown incredibly tall. The hazel rows have also thrived, where they have enough light, they are producing quantities of nuts in a good year. As the poplar grew up and the hazel filled out between the rows of poplar, bringing machinery up the alleys became increasingly difficult and shading of crops also began to be an issue.

These trees have been let grow as they like and the land has been put back to pasture and is topped occasionally to keep the trials open and accessible.



Poplar and Hazel alley system left to grow wild - Claydon Estate, Buckinghamshire.

The walnut trials were set at 10m centres and have grown strongly to form an almost closed canopy, similar to those at Boxted. The trees were goblet pruned and soon got too big and spreading to allow arable machinery to pass along the alleys. They have been left entirely to nature for a number of years, the area is rewilding and now almost impenetrable. The trees are providing a dense and rich habitat for birds, insects, mammals, fungi and all sorts of other wild flora and fauna, with fallen nuts and branches and other dead and decaying wood amongst grasses and weeds where there are patches of light.

It may be that these trees could be brought back into productive management; grazing small breeds of cattle that would get in among the trees could work, along with some light pruning and reviving an annual harvest of both walnuts and hazelnuts. For the moment though, the trees are doing no harm soaking up carbon and providing fabulous habitat.

George Young - Curtis Farm, Fobbing, Essex.

George kindly showed us around his newly planted silvoarable field, the last of our visits to East Anglia. In 2020, George planted a large field on his 485 Ha farm with an alley system of 7,000 fruit and nut trees, timber trees, coppice and fruit bushes. The project has been funded by the Woodland Trust and includes native trees, common fruit and nut trees, along with more exotic and experimental species; almonds, olives, peaches and nectarines which may thrive as the climate changes and warms up.

He is growing diverse arable crops in the alleys, combining traditional crops of cereals, rape and beans with chickpeas, buckwheat, hemp, linseed, lentils and heritage grains. George has included

herbal leys in the system and grazes cattle as a part of the arable rotation as well as on the permanent pasture elsewhere on the farm.

The trees are set in rows as 6m wide belts on 42m centres, leaving 36m alleys. The rows are set just slightly off north south - NNW to SSE. George hopes to grow some good timber, produce plenty of fruit and nuts, use coppice for mulch materials and also some more unusual crops; birch for tapping for sap as syrup and kiwi vines are included in the plans.



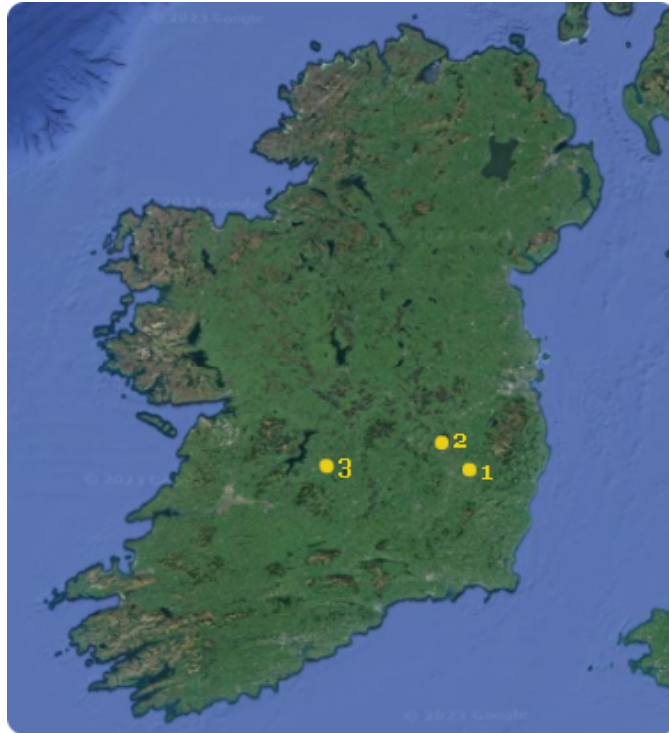
Young silvoarable alley planting - Curtis Farm, Essex.

George is aiming to build multiple income streams for the farm and to give really strong support to biodiversity, especially pollinators, in advance of a planned transition to organic in the near future. There are wild margins around the agroforestry providing further habitat for wildlife. There is a thriving farm shop on the farm and this will provide an ideal path to sell small harvests from many productive fruit and nut trees and an opportunity to add value to crops in sales of jams, jellies, juices etc..

Baseline Data:

Baseline data was collected at the three farm sites and is included in the 'Baseline Data' folder along with a summary report. Baseline work included habitat, biodiversity and bird surveys, a desk study of soils, earthworm counts, VESS observations, soil nutrient and elemental analysis, soil carbon audits and soil microbiology analysis. We aim to continue with monitoring and to repeat the tests and surveys at three year intervals in as much detail and for as long as funds permit.

The Three Farms - Planning, Design and Establishment.



*Map showing the locations of the three trials. Project 1 - Downings, Co. Carlow.
Project 2 - Athy, Co. Kildare. Project 3: Shanbally, Co. Tipperary.*

Project 1:

Jack Browne - Laurel Lodge, Downings, Tullow, Co. Carlow R93 C622.

Summary of agroforestry planting:

Alley system of 8 rows of trees, set 6° off north south. There are 6 rows, 3m wide, set at 27m centres giving 24m alleys, and a further 2 rows, 6m wide, set at 91m centres giving 85m alleys. Mixed native and non native timber trees, coppice, fruit and nut trees and trees for cut foliage. Total 2,982 trees and 4,392 linear metres of planting. Average of approx 100 stems per hectare across the 28Ha agroforestry area.

Introduction and Background: The farm is 39 Ha with approx 28 Ha to accommodate the agroforestry work. The land is in conversion to organic and is under no-till arable.

Jack applied for the Organic Farming Scheme in 2021 and so the land is currently in conversion to organic. The farm had been managed as intensive, mostly monocrop tillage production for the previous 7 years, with regular ploughing.

After harvest 2021, half of the farm was planted in a multispecies sward for fertility building. Cover crops were also planted and field divisions created to start a rotation. Currently the plan is to design a 5-7 year rotation with 2-3 years as a multispecies grass sward.

Jack has also put 2.5Ha at the south west corner of the field into the DAFM Native Woodland Scheme, planted in 2021.

When we first met, Jack had already carried out detailed research and had put together draft designs for his agroforestry. We have made various adjustments during the planning and design process, but the planting work has stayed close to his original plan.

Jack is quite brave in his commitment to the concept of adding trees to this valuable area of tillage and also willing to put in the hard work that will be required to bring the trees to establishment and to make good of the income options that will present themselves as the trees start to mature.

The planting work comprises a silvoarable alley system with wide alleys running 6° off north south and a great diversity of native and non native trees grown for fruit and nut production, foliage for sales to the cut flower industry, timber and other coppice and wood products. Possible added cut flowers, soft fruit and other vegetable crops may be cultivated under the tree lines or within the alleys.

Jack was willing to lose his basic farm payments on small areas of the land if it meant he could establish the agroforestry fully, however the nature of the planting designs with very wide alleys between the rows left overall canopy cover very low and stems per hectare also low enough to avoid any loss of payments.

Screening for Appropriate Planting:

A desk based screening and on site surveys of habitats, general biodiversity and birds found no barriers to tree planting on the site. Please see Baseline Data report for details of site surveys.

Designations: There are no SACs or SPAs or other designations on or directly adjoining the planting site. The River Slaney SAC (Site Code 000781) is located +/- 500m to the west and south west of the farm.

Sites and Monuments: There is an enclosure located to the south west of the field, beyond the farm boundary (Code CW008-062) and a moated site approximately 200m beyond the farm boundary to the south (Code CW008-024). The enclosure is at least 100m from any likely planting and is already buffered by the young native woodland planted recently which features an unplanted semi-circle around the area.

Local Landscape: The rolling farmland of the area doesn't present any concerns with the look of tree planting on the land. The alley planting will be laid out in straight lines, however the field falls away to the south and west and there are natural undulations to this fall which should give a pleasing look of curving lines from any local viewpoints.

Agroforestry Aims:

Jack had fairly clear ideas about what he hopes to achieve from the agroforestry:

Shelter: The agroforestry is spread over approximately 28Ha in one open field. Exposure is an issue and the hope is that adding the rows of trees will help with improving shelter from prevailing winds and creating a beneficial microclimate for crops.

Protecting and Improving Soils: The shelter created by the tree lines will help to protect the soil from wind erosion and will help to intercept heavy rainfall and minimise water erosion to soils. Leaf litter and light brash fall from the tree lines will add organic matter, nutrients and trace elements to the alleys over time. Jack was also keen to include a coppice for biomass element to the design, giving him the option to harvest short rotation coppice for biomass sales but also to chip it back onto the land to help with organic matter and nutrient content in the soils.

Biodiversity Support: The tree lines will create wonderful corridors of habitat and will provide support for biodiversity all across the site. Jack is keen particularly to encourage pollinators to support pollination of both the crops in the alleys, but also of fruit and nut trees included in the tree lines.

Farm Income: Jack wants to add to the farm income streams with more diverse harvests than just those from the tillage. There are opportunities to create future income through fruit and nut harvests, timber sales, sales of biomass and other coppice materials, and from cut foliage.

Concerns and Challenges:

Wind Tunnelling:

The biggest concern with the overall design is the chance of damaging wind tunnelling effects created by the tree lines and alleys. The field is very open and exposed and whilst the tree lines are set to themselves provide shelter to crops, wind directions change considerably through different seasons and weather patterns, and wind tunnelling could be a problem.

Appropriate and safe species selection:

Jack's family breed thoroughbred racehorses on other parts of the family farm. He has sown a 3Ha section of the big field with a diverse grass and herbal ley. This can be topped back onto the alleys to improve fertility or be let grow up to a hay or haylage crop and used on the farm to feed the horses.

Care needs to be taken to avoid trees that are poisonous to horses and to minimise the risk of fallen seed, leaves, branches etc being taken up into hay or haylage bales. Species of concern that are in the designs are oak (acorns), sycamore (seed and seedlings), prunus (dying leaves at leaf fall), eucalyptus (leaves and wood) and spindle.

The majority of the risk is during the late summer, autumn, winter and spring when these trees start to drop seed and leaves, and then when fallen seed begins to germinate. Hay cutting season in June and July misses these risky times and with good vigilance checking the crop during early spring growth and before cutting, Jack thinks he can get a clean hay crop. Extremely poisonous trees like Yew will be avoided altogether. The tree rows where hay would be cut include only fruit and nut trees and alder. Prunus and some few eucalyptus trees are over some of the western relevant alleys but should only drop leaves in any amount after hay is cut. Oak and sycamore are well out of the way and therefore should pose minimal risk.

Harvesting:

The designs for Jack's land include a great variety of trees and possible harvests coming from the trees. Brilliant as a demonstration, but also a lot of hard work coordinating multiple small harvests and converting them all to useful income. Jack aims for early harvests to serve the farmhouse kitchen and will look at the possibilities of a farm shop, local community distribution, 'pick your own' or community foraging type schemes. As we will be trialling many species, it is likely that some trees will fail to thrive and these can be replaced with others that are doing well. Over time, this will likely narrow down the diversity, giving simpler harvest cycles.

Sourcing the trees:

As expected, quite a large number of the trees on the design are not grown in Ireland. We will source as many Irish grown trees as possible, others can be sourced imported from trusted nurseries and there will be some that we cannot get hold of at all.

Designing the planting:

Jack's original draft design was a great start and he knew fairly well what he wanted. He had planned 8 rows in total running 6° off north south. The tramlines on the farm were running 12° off north south for ease of crossing the gradient on the field. This small adjustment was a practical compromise and shouldn't affect light levels in any significant way.



Jack's original draft plan - showing fruit and nut tree lines in red, permanent shelter belt in yellow, and timber and coppice lines in green.

The first four shorter rows (marked in red) at the western side of the field were for mixed apples and pears with alder at intervals to aid nitrogen fixing in the soil. The alder can be coppiced as often as needed to prevent it becoming over big and shading the alleys or fruit trees. These rows were on 18m centres and 3m wide, leaving 12m alleys.

There was then a longer row (marked in yellow) designed as a shelter belt to protect the fruit trees from cold east winds and to shelter the rows to the east of the field from the prevailing south westerly winds. East of this row were three very long rows (marked in green) which Jack hoped to grow with trees for biomass and possibly some timber trees with biomass coppice nurses. These rows were set at 78m centres to leave 72m alleys. These rows were 6m wide to accommodate two or three lines of trees on each row.



The final plan, showing mixed fruit and nut tree rows in red and timber and coppice rows in green with permanent native shelter belts in yellow.

Adjustments made to the designs started with widening the distance between tree rows for the fruit tree section to 27m, giving 24m alleys; we felt that 12m alleys would be too narrow. Jack added another row to this section and plans evolved to have fruit trees to the far west of these rows, and gradually shifting species across towards the east, adding in nut trees and trees for cut foliage (eucalyptus and holly), mixed with various other fruit trees plus the Italian alder and common alder for nitrogen fixing. A few taller timber trees are added into the fifth row.

The bigger coppice and timber rows were set further apart at 91m centres and 6m wide to give 85m alleys, which would give space to add more tree rows between in future if Jack finds the system is working. These rows were planned to include timber trees (small leaved lime, walnut, oak, sycamore, wild cherry, whitebeam, and scots pine) as a central row. Diverse nurses of smaller trees that will coppice well for biomass and including plenty of willow would then be planted as two rows either side of the timber trees. We decided to source willow suitable for basketry as well as more common varieties. The basketry willows can be chipped for biomass just the same as the others, but they can also be cut and sold for basketry materials and as slips for others wishing to establish basketry willow.

The central shelter belt became a hybrid row - 3m wide like the fruit and nut rows, but including timber species and lots of diverse lower growing species.

We looked at adding in a dog leg in the rows to stop the wind tunnelling and also at adding short lengths of hedge across the alleys to break up the wind. The hedges would no doubt slow the wind, but they would be awkward to work around for tractors. We decided in the end to leave the rows straight and to add in some extra shelter belts at farm boundaries. Jack will observe the conditions and if the wind is too much, we can revisit adding horizontal hedges or further boundary belts in future.

List of species planted at Laurel Lodge:

Acer Pseudoplatanus (Sycamore)	30
Alnus Cordata (Italian Alder)	100
Alnus Glutinosa (Common Alder)	200
Betula Pendula (Silver Birch)	100
Betula Pubescens (Downy Birch)	200
Carpinus Betulus (Hornbeam)	36
Castanea Sativa (Sweet Chestnut)	62
Cobnuts - Cosford Cob	28
Cobnuts - Kentish Cob	28
Cobnuts - Webbs Prize Cob	28
Cobnuts - Nottingham	28
Cobnuts - Rode Zellernoot	28
Corylus Avellana (Hazel)	68
Crataegus Monogyna (Hawthorn)	500
Cydonia oblonga (Quince- Serbian)	10
Elaeagnus Umbellata (Autumn Olive)	23
Eucalyptus Gunnii France Blue	5
Eucalyptus Neglecta	6
Eucalyptus Pauciflora Debeuzevillei	4
Eucalyptus Pauciflora Niphophila	5
Euonymus Europaeus (Spindle)	55
Frangula alnus (Alder Buckthorn)	10
Ilex Aquifolium (Holly)	60
Juglans Regia (EuropeanWalnut)	81
Malus d. (Medlar - Nottingham)	5
Malus d. (Medlar - Westernveld)	5
Malus d. Boskoop (Apple)	10
Malus d. Dabinette (Apple)	10
Malus d. Greensleeves (Apple)	10
Malus d. Jonagold (Apple)	20
Malus d. Katy (Apple)	15
Malus d. Red Pinova (Apple)	15
Malus d. Sander (Apple)	15
Malus sylvestris (Crab Apple)	60
Morus Alba (Mulberries - White)	15

Morus Nigra (Mulberries - Black)	15
Pinus Sylvestris (Scots Pine)	150
Platanus x Acerifolia (London plane)	5
Populus Tremula (Aspen)	70
Prunus Avium - Lapins (Cherry)	5
Prunus Avium - Sunburst (Cherry)	5
Prunus Avium (Wild Cherry)	65
Prunus d. Czar (Plum)	5
Prunus d. Opal (Plum)	10
Prunus d. Ruth Gerstetter (Plum)	5
Prunus d. Victoria (Plum)	10
Prunus Persica J.H Hale (Peach)	5
Prunus Persica Johnny Brack (Peach)	5
Prunus Persica Peregrine (Peach)	5
Prunus spinosa (Blackthorn)	50
Pyrus Communis Beurre Hardy (Pear)	5
Pyrus Communis Conference (Pear)	5
Quercus Robur (Pedunculate Oak)	200
Rhamnus Cathartica (Purging Buckthorn)	20
Rosa Canina (Dog Rose)	40
Sambucus Nigra (Elderberry)	60
Sorbus Hibernica x Sorbus Aria (Whitebeam)	30
Tilia Cordata. (Small leaved lime)	42
Viburnum Opulus (Guelder Rose)	25
Salix (Various - suitable for basketry)	300
TOTAL:	2,982

Lists of species included on each row running west to east:

Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Native Shelter Belts
3m wide	3m wide	3m wide	3m wide	3m wide	3m wide	6m wide	6m wide	4m wide
188m long	273m long	523m long	560m long	692m long	664m long	642m long	400m long	450m long
Pear	Plum	Apple	Apple	Holly	Holly	Holly	Holly	Hawthorn
Peach	Cherry	Eucalyptus	Eucalyptus	Sweet Chestnut	Walnut	Walnut	Walnut	Hazel
Apple	Italian Alder	Holly	Holly	Walnut	Hazel	Hazel	Small Leaved Lime	Oak
Alder	Autumn Olive	Hazel	Sweet Chestnut	Hazel	Small Leaved Lime	Small Leaved Lime	Elder	Scots Pine
		Italian Alder	Walnut	Small Leaved Lime	Elder	Elder	Sycamore	Crab Apple
		Autumn Olive	Hazel	Medlar	Sycamore	Sycamore	Oak	Birch
		Willow	Italian Alder	Quince	Oak	Oak	Willow	Wild Cherry
			Willow	Mulberry	Alder	Scots Pine	Scots Pine	Alder
				Elder	Willow	Birch	Birch	
				Oak	Scots Pine	Wild Cherry	Wild Cherry	
				Alder	Birch	Hawthorn	Hawthorn	
				Autumn Olive	Wild Cherry	Aspen	Aspen	
				Scots Pine	Hawthorn	Whitebeam	Whitebeam	
				Birch	Aspen	Honeysuckle	Dog rose	
				Wild Cherry	Whitebeam	Dog rose	Blackthorn	
				Hawthorn	Dog rose	Blackthorn	Spindle	
					Blackthorn	Spindle	Willow	
					Buckthorn	Willow		
					Spindle			

The planting work and early management:

The rows were marked out in November 2021 with GPS guidance on a tractor with stubble grubber. The first fruit tree row to the east, and the westernmost two timber and biomass rows were ploughed to cut through the grass leys in the east and to make for easy planting of willow slips on the eastern rows.



Ploughing the lines for the tree rows.

The rows were then harrowed several times during the early part of the winter to knock back weed growth and were then sown with a flowering seed mix for pollinators and to hopefully outcompete weeds and provide a sheltering nurse for the newly planted trees.

A JCB loader was used to dig planting holes and break through the plough pan. This didn't work well and was damaging the ground when the weather turned wet, so a small tracked mini digger was hired and holes were dug with a 30cm bucket which was much better and didn't do any damage.

We were concerned that the soil in the field would be short of mycorrhizal fungi from many years of conventional arable work. Jack dug some black soil from an old hedgerow on the farm and added approx. 400g to each planting hole for all of the fruit and nut tree rows. This soil should have plenty of mycorrhizal fungi to help populate the soil around the trees.

The fruit and nut tree rows were planted in February 2022, the other rows were planted in March with a few of the smaller trees dotted in during April. Further filling in of species we couldn't get that winter were planted over the winter of 2022-23.

Rabbit spirals with a simple cane were put around the more valuable trees, particularly the fruit and nut trees to protect against rabbits and voles. Fruit and nut trees were not staked and tied; they were

planted as small trees and should not need staking if their root establishment is good. Trees tend to fight and vibrate against ties and stakes in the wind and this serves only to damage the bark and loosen the roots. Most of the other trees were left unguarded; the ground cover around them should protect them against rabbits and they will only rub against the guards in the wind.

The fruit and nut trees were pruned in April 2022 to minimise wind damage while they settled in. The trees generally did really well during the very dry summer of 2022 with minimal losses. The larger trees did particularly well and fruit trees settled and put on good growth. The pollinator flowering mixes produced a brilliant show and were alive with insects when we visited and doing a great job sheltering the trees and helping to conserve moisture so the trees did not parch in the heat.



Young fruit tree rows with pollinator flowering mix ground layer - Summer 2022.

In March 2023 sheep were introduced to the arable rotation to graze the leys between the rows as two mobs, one of hoggets and another of ewes and lambs. The trees were protected with lines of electric fence which worked very well. There were a few escapees who showed minimal interest in the trees bar some small bits of nibbling. Any tree casualties will be replaced next winter.



Sheep grazing one of the alleys between the tree rows - early spring 2023.

The tree rows have not been weeded as we are keen to preserve the shelter of the flowering ground layers during all seasons and to deter rabbits who hate to push into undergrowth and get wet faces from rain and dew on the plants. Some minimal trampling and 'finding' of trees for head counts is done as needed.

Jack planted almost all of the trees himself with occasional labour brought in and other help from family and friends. He struggled at times to fit the planting around his busy working and farming life, but his close interest in the trees and the planting work will pay dividends for the project as he knows the rows intimately and will notice immediately what is doing well and what is not.

We are making regular visits to the project to monitor progress and Jack is making his own observations. We are on hand to provide advice and support throughout the main establishment phase and beyond. We will work at restocking failures over the next few years until around year five when we would expect to have full establishment. The fruit and nut trees will need regular formative pruning to get them into good structural shape and the timber trees will need work selecting leaders from any forks and taking off side shoots. The coppice trees will also be cut to establish the first rotation.

Future Planting:

There will likely be a certain amount of restocking to do over the next few years. Some of the fruit trees may not like the conditions and can be replaced with more of those that do. If wind tunnelling becomes an issue, Jack can opt to add in more boundary shelter belts, or crossing hedges on the alleys, which Trees on the Land will be very willing to support. Additionally, if he ever wants to add in new rows of trees between the timber lines to split the alleys, we will be delighted to help.

There are some small sections of the native shelter belts and the wider tree lines that need to be completed. Plants have been supplied for these and they are heeled in safely and will be lifted and planted next season.

Project 2: Andrew Bergin - Grattansbrook, Athy, Co. Kildare.

Summary of agroforestry planting:

A total of 760 native and non native trees set as a double row along the field-side edge of pre-existing headlands in two fields and totalling 680m of linear planting. The planting includes 165 (22%) fruit and nut trees and 595 (78%) timber trees. Trees are set at 1.5m - 2m spacings with later thinning and respacing planned.

Background & Introduction:

Grattansbrook is a conventional tillage farm of approximately 90 Ha, of which two fields totalling 12.7 Ha accommodate the agroforestry work. The farm is under no-till management growing winter and spring cereals, beans and oil seed rape, with seasonal use of cover crops. The farm has headlands of 7-8m or more around most of the field boundaries, these headlands are mown annually at the end of the growing season and his hedgerows are managed for wildlife as far as possible, with intermittent cutting.

Andrew is participating in the Protecting Farmland Pollinators EIP and the DANÚ EIP project. He has been working to establish trees (native and naturalised) on the farm for several years, with some tree lines, hedgerow trees and pockets of trees in field corners all well established. When we first spoke, he was keen to look at continued restoration of old hedgerows and adding further pockets of native trees through the Trees on the Land project. He was interested in looking at silvoarable work adding tree rows across the fields, but he had reservations. His questions and concerns have thrown up a number of important issues with establishing trees on tillage land; while the final planting work is fairly simple and minimal, the design journey has been extremely valuable to the project.

Aims & Requirements:

Quality Timber - One of Andrew's initial aims was to showcase production of quality timber for high value sawlogs and veneer if quality is good enough. The early designs targeted this with the understanding that constant careful management of the trees for good straight growth and form was crucial. The final designs include timber trees amongst other fruit and nut trees; we will work at encouraging the best possible form for the timber trees in hope of producing useful timber for the future.

Biodiversity - Andrew is keen to support as much wildlife as possible on the farm. His work to date with the hedgerows, pockets of trees and the field headlands are already providing great habitat with good diversity of ground flora on the headlands and an abundance of insects and birds showing that his measures are working. Early designs focused on timber production and these trees, set in rows to create an alley system, would provide additional habitat across the fields. Later designs remove the alleys but look at maximising the biodiversity support of trees set along the headlands.

Soil Support - Andrew is passionate about the soils on his farm and his current no-till system and use of extensive headlands will be working to prevent soil loss and degradation. Adding further trees should contribute to soil health in absorbing and interrupting runoff of water and fine particles as well as adding organic matter through leaf fall and light brush which in the longer term will support soil structure, bacterial and fungal content and earthworm populations as it rots down.

Concerns and Challenges:

Basic Farm Payments, Land Designations and Land Values:

Andrew's first questions to us were whether planting trees onto his fields would lose him parts of his basic payments and whether his land would be re-classified as forest land.

Andrew was prepared to forgo small areas of farm payments if designs suited his aims, but he was not willing to risk having the land classification changed from agriculture to forestry with consequent reduction in land value. We felt it wasn't a great advertisement for agroforestry if a trial scheme designed to encourage farmers to plant agroforestry came with a loss of payments for the farm and a massive devaluation of the land. We agreed that the tree planting work would need to be designed so that farm payments and agricultural land classification were kept intact.

As the designs evolved, it was clear that there was no likelihood of reaching any of the above thresholds, so the land will remain safely with an agricultural designation and with farm payments.

Shading of Crops and Root Competition:

Andrew has noted that in some areas along the edges of his fields, where he already has tree lines, he was seeing poor germination of arable seed. These areas appeared to correspond with tree roots close

to the surface of the soil. This is most likely competition for moisture or nutrients or both between tree roots and the germinating seed.

We supposed that the no-till system could be allowing the root competition; with traditional regular ploughing, tree roots would be cut or deterred by the regular disturbance and prevent this kind of competition. In a no-till system the tree roots can travel as they like with minimal interference and with many lines of trees across a field this could pose a significant problem for productivity of the arable crop. The possibility of running a subsoiler along the edges of the tree lines to cut back the roots was discussed; we agreed to try this on some short lengths over the coming years and observe the results. Our visits to agroforestry at Whitehall Farm and at Wakelyns did not see this issue and we can only assume this is because both systems are ploughing the alleys for cultivation.

Shading, we felt, was easier to manage, by keeping any cross-field lines roughly north south allowing maximum light from the south. Using coppice and pollard techniques to manipulate tree canopies and reduce shading are also useful tools which we agreed to look at as designs developed.

Harvesting and Multiple Crops:

Andrew was wary of creating a lot of extra work on the farm for small incomes scattered through the year which could see costs of harvesting wiping out any profits from sales. Quantities of unharvested fruit and nuts spoiling on the fields would be a waste and especially if good land is taken up in the process.

We discussed a focus on one particular crop with a reliable use, apples for juicing or coppice for biomass for example, to keep things simple and create just one annual harvest to think about. This led to looking at timber trees where any harvesting would be intermittent, with years potentially between thinnings and decades before significant harvests.

Andrew's concern subsided somewhat with the evolution of the design work to planting the edges of the headlands; Andrew felt that if fruit and nuts could not be harvested and made use of, they wouldn't do much harm falling onto the headlands and would be great support for birds and other wildlife on the farm.

Invasive Trees - Seedlings and Suckers:

Andrew outlined concerns about seed fall from trees and the potential for troublesome seedlings or suckers getting into the arable crops. Andrew's no-till system would likely struggle to prevent seed regeneration, although herbicide applications in preparing fields should prevent most regeneration taking hold. Sycamore would be a main culprit for this sort of problem. It is included in the designs for its hardiness and quick growing fine timber. If it starts to cause a problem, it can be turned over to short rotation coppice to prevent seeding, or removed entirely from the system.

Suckering trees, *Ulmus*, *Prunus*, *Populus* and others could all attempt to break into the fields. Without the option to deep plough with the no-till system, and with herbicides potentially reaching back to the parent plants and killing the planted trees, the situation will need to be watched as we will use some suckering species in the planting work. This concern could come to nothing, so we will observe with interest. As with the root competition issue, deep subsoiling along the edges of the planting areas may solve any suckering problems.

Removal of Trees:

If the trees are deemed to be failing and not fulfilling the objectives of the design, or if they are interfering with the arable work, or causing the land to be devalued, Andrew wondered whether it would be possible to remove the trees. This led to an interesting discussion on the relative value of adding temporary tree cover to land and whether relaxing views on permanence for agroforestry systems would lead to overall loss or gain of tree cover nationally. While we aim for permanent tree cover from this EIP, and certainly Andrew is keen to see this, we felt it reasonable to keep an open mind and allow (in our landowner agreements) that the tree cover could be removed in future if it is not working for the farm.

Screening for Appropriate Planting: A desk based screening and further site surveys of habitats, general biodiversity and birds found no barriers to tree planting, bar leaving sensible margins to pre-existing features. Please see baseline data folder for survey details.

Protected Areas: There are no SACs or SPAs or other designations on or directly adjoining the planting site. The river Barrow (Code 002162) is 2 km north east and a tributary, an unnamed stream, runs along the north western boundary of the site. Ballyprior Grassland (Code 00256) is 5 km to the west of the site.

Sites and Monuments: There is an enclosure in the south west corner of the southern planting field (Code KD035-054). Planting designs take this into account and leave a buffer area.

Local Landscape: The landscape around the farm is relatively flat, mostly under tillage in large open fields, with some low hedgerows kept closely flailed. We did not have any concerns in terms of the impact of tree planting in alleys or belts to the local landscape.

Design 1 - An alley System:

The first draft of designs looked at an alley system with rows of trees drawn 39m apart, leaving a 36m alley, and set in from field boundaries by 30m to give space for machinery access and turning. The wide-spaced rows aimed at giving field crops plenty of light and ventilation and keeping overall canopy cover low. Trees would be set in single lines at 3m spacings on the rows and would be managed carefully for the best form with steady thinning to favour the very best trees grown on for a final timber crop.



Design 1 - Alley system with rows of timber trees at 39m centres and alleys of 36m

Orientation of the rows was north south for best light in the more northern of the two fields. In the southernmost field, rows were drawn slightly north west to south east with the idea of breaking up any wind tunnelling effect across the two fields, while maintaining good light levels and minimum shading.

This planting would amount to approximately 2,000m of linear planting accommodating 650 trees at approximately 50 stems per hectare. At this stage we hadn't decided whether to cut the lines short to avoid the pink area around the Sites and Monuments enclosure or whether to leave that field alone and work with only the northernmost field.

Species would focus on timber and include the following trees and percentages:

10% Irish provenance sessile oak - for good form and hopefully excellent timber.

10% Sycamore - excellent for bees and other pollinators, vigorous and fine timber if grown straight.

5% Oriental plane or hybrid london plane.

20% European walnut, black walnut and hybrid walnut - Ideally seed-grown in Ireland, but possible sources in France, Germany and US. Hybrid varieties NG23 and MJ209 recommended. Set to avoid frost pockets.

5% Small leaved lime - Excellent for bees and very fine timber. Harvested trees would likely coppice back leaving options to maintain as coppice or to single for further sawlogs.

15% Elm - Several disease resistant varieties available, Rebona appears to be most suited to agroforestry. Possible sources in Germany and the UK.

5% Wild Service Tree - Very high value timber. Small stature tree will give variety of canopy height for diversity of birds, bats etc. Flowers and fruit for insects and birds.

20% Wild Cherry - Excellent timber with fine straight grain. Fast to establish and mature. Look to source from UK breeding trials. Watch for suckering. Good flowering for pollinators and fruit for birds.

5% False Acacia - Good timber. Improved varieties available in Germany. Watch for suckering. Seed provides some value for wildlife.

5% Sweet Chestnut - Excellent timber, fast growing, harvested trees should coppice back with option to single. Good for wildlife, flowers for bees and nuts for small mammals.

Trees would be set with the hardier species, oak, sycamore, elm and cherry kept to the outermost parts of each field and others set more centrally to make use of shelter given by the other trees.

The trees would be thinned and harvested at different rates over the years, hopefully giving good income in phases, rather than all in one big harvest. This would also allow that the rows can be managed to a certain extent as a continuous cover system, so that at no point are all the trees harvested and with no need for the expense and trouble of replanting the whole system. Some species will coppice back or respond with suckering after felling and may not need replanting, others could be replanted as needed, or new species added. There would likely also be a certain amount of regeneration from seed. In any case, planting 25 or 50 small whips at a time to restock after felling is inexpensive and quick to do.

Design 2 - A Lower density alley system with Short Rotation Coppice:

We adjusted the designs in response to Andrew's ongoing reservations about the possible impacts on germination as previously discussed. This next design took out the southern field on account of the Sites and Monuments enclosure (leaving us with incomplete lines) and looked at reducing the number of tree lines and or including a coppice system so that light levels could be better manipulated across the fields.

There were a few options at this point: The tree lines could be set with alternate rows of timber trees and coppice, allowing every second row to be cut low on any appropriate rotation. Another option took out half of the lines with those remaining set with timber trees or coppice trees or both. A third put all rows set with coppice, with a variety of short and longer rotations.

Longer rotations of coppice could include oak, sweet chestnut, lime and others to produce valuable coppice wood for fence posts, rails, woodworking and other timber framing work. Shorter rotations of hazel, willow and poplar could produce biomass or be chipped straight back onto the fields to rot down.

Short rotation coppice could be cut with a combine just after the main harvest is finished. This would give strong control of the canopy and see all tree lines essentially mown to the ground every two or three years. The edges of each row could be subsoiled at the same time of year to keep roots in check.

We discussed whether access to the trees could be an issue and needing a permanent headland along the southern boundary of the field, although by keeping to only timber and biomass trees, they could be left alone for much of the year with work carried out harvesting coppice, pruning and thinning trees taking place after harvest and before any winter sowing.

Design 3 - Headland planting:

Andrew still had concerns about the alley system in terms of germination and potential competition between crops and trees. He was however keen to look at planting into the headlands around the field boundaries. He had also decided that including a greater variety of trees would be good, so we started to add fruit and nut trees to the timber trees on our list to create a dual purpose design.



Design 3: Headland Planting - A double row of trees set 5-6m out from the field boundary with alternating groups of fruit and nut trees and timber trees.

We felt it was important not to lose the habitat already established in the headlands. They are providing fabulous grassland habitat for birds, insects and mammals, augmented by hedgerows at the field boundaries. Whilst adding trees to these headlands would seem to be a good idea, we want to avoid replacing one habitat (grassland / meadowland) with another (linear woodland). We hope to find a balance between the two to gain maximum diversity of habitat.

The design was developed to set the trees onto the fieldside edge of the headlands and in some places out into the field a little to widen the headland, leaving a wide strip of 5-6m or more of the original grassland between the trees and the boundary hedgerows. Trees were set in a double staggered row at 1.5m to 2m spacings. This close planting aims to draw up and establish the trees quickly to get good early growth for the timber trees. We may lift and re-space some of the fruit and nut trees to give them more space later on. Final tree numbers were 760 trees, set across a total of 680m of headlands, the shorter length being 230m and the longer 450m.



Newly planted trees at Grattansbrook

The aim with this diverse planting is to create a rising and falling canopy with as much diversity of species and variations in height as possible. There are smaller shrubby species and fruit and nut trees giving a lower and middle height layer, and then taller timber trees. The trees are arranged so that timber trees (walnut, oak, sweet chestnut, cherry, sycamore, lime, plane, Italian alder, false acacia and whitebeam) are in small groups of 10 - 25 trees by species and can draw each other up, hopefully good and straight. These groups can be thinned to favour those with the best form. Between each group of timber trees are mixed fruit and nut trees (heritage and modern apples, pears, plums, walnuts, cobnuts, pine nuts, common hazel, crab apple).

The trees were a mix of native species grown in Ireland from Irish seed and other non natives, some grown in Ireland and others imported. We were very lucky to be able to include some special pine nut trees via Jason McCormack in Co. Clare and originally from the late Andi Wilson who did so much research into fruit and nut trees. Twenty of his pine trees, selected for their good production potential in Ireland, have been included in the planting. They could provide valuable yields of pine nuts if they like the conditions at Grattansbrook.

Pedunculate oak was included in the designs instead of the preferred sessile oak, which generally would produce better timber. This was on account of the pedunculate oak having far better form than the sessile available and we decided to include it and seek out better form sessile oak for any future planting.

One of the key benefits of working on the headlands is that access for weeding, restocking, pruning, thinning, harvesting of fruit and nuts, later harvesting of timber and all manner of other operations relating to the trees can be done as needed without needing to cross crops in the field; the headlands provide year round access to the trees. The gap between the trees and the hedgerow boundaries is wide enough to access with a tractor and trailer.

The trees were planted during the late winter of 2023 by our most experienced tree planter Dave Burton; he has planted over a million trees in his lifetime and is extremely knowledgeable, setting trees just right and giving them a great start.

Tree Species Planted:

Timber Trees:		
Italian Alder	<i>Alnus cordata</i>	50
Sweet Chestnut	<i>Castanea sativa</i>	50
Walnut	<i>Juglans regia</i>	100
London Plane	<i>Platanus hispanica</i>	5
Pedunculate Oak	<i>Quercus Robur</i>	50
False Acacia / Black Locust	<i>Robinia pseudoacacia</i>	50
Whitebeam	<i>Sorbus Hibernica</i> x <i>Sorbus Aria</i>	30
Small Leaved Lime	<i>Tilia Cordata</i>	30
Sycamore	<i>Acer pseudoplatanus</i>	230
Fruit and Nut Trees:		
Cobnut	Nottingham, Cosford, Webbs Prize, Red Zeld, Kentish	20
Hazel	<i>Corylus Avellana</i>	10
Heritage Apple	<i>Malus d. 'Irish Pitcher'</i>	2
Heritage Apple	<i>Malus d. 'Bloody Butcher'</i>	2
Heritage Apple	<i>Malus d. 'Brown Crofton'</i>	1
Heritage Apple	<i>Malus d. 'Cavan Sugarcane'</i>	1
Heritage Apple	<i>Malus d. 'Irish Peach'</i>	2
Walnut	Fertignac, Parisien, Fernor	25
Apple	<i>Malus d. 'Bramley's Seedling'</i>	2
Apple	<i>Malus d. 'Discovery'</i>	1
Apple	<i>Malus d. 'Egremont Russet'</i>	2
Apple	<i>Malus d. 'Ellison's Orange'</i>	2
Apple	<i>Malus d. 'Howgate Wonder'</i>	1
Apple	<i>Malus d. 'Katy'</i>	2
Apple	<i>Malus d. 'Red Devil'</i>	2
Wild Crab Apple	<i>Malus sylvestris</i>	10
Pine Nut	<i>Pinus Cembra</i>	5
Pine Nut	<i>Pinus koraiensis</i>	5
Pine Nut	<i>Pinus Pinea</i>	5
Pine Nut	<i>Pinus Pumilla</i>	5
Plum	<i>Prunus d. 'old Greengage'</i>	5
Plum	<i>Prunus d. 'Opal'</i>	5
Plum	<i>Prunus d. 'Oullins Golden Gage'</i>	5
Plum	<i>Prunus d. 'Victoria'</i>	5
Pear	<i>Pyrus c. 'Beth'</i>	2

Pear	Pyrus c. 'Beurre Hardy'	3
Pear	Pyrus c. 'Concorde'	5
Pear	Pyrus c. 'Conference'	5
Pear	Pyrus c. 'Emile d'Heyst'	1
Pear	Pyrus c. 'Williams Bon Chretien'	4
Elder	Sambucus Nigra	20
	TOTAL Trees	760

Tree Protection:

We have not guarded or staked trees for this project. There is no livestock to worry about and we believe that the trees are best left alone as much as possible to get roots down and through the plough pan to anchor themselves strongly. We want to avoid damage to bark from trees rubbing against guards, roots working around stakes, or loosened root systems from vibrating against a stake.

Management:

The trees will be hand weeded during the early years to ensure they get the best chance at good straight growth and to reduce competition. General restocking will be carried out; failing trees and those not enjoying the conditions at the site, will be replaced with other species or varieties that are settling in better and thriving. The trees have been set close together to encourage strong growth. This will favour the timber trees which should draw up well in response, however many of the fruit and nut trees will find these spacings too close as they begin to mature. We may move some of the fruit and nut trees in the next year or so to give them more space.

Side shoots will be pruned on the timber trees and any forked trees will be pruned to leave one leader. Fruit and nut trees will be pruned as needed and likely goblet pruned to give best fruiting shape and to create a diversity of shapes in the canopy. Coppice and any pollard trees will be worked on as needed to create a sensible rotation.

The edges of the tree rows, where they meet the field, may need to be subsoiled occasionally to keep them back from the field and prevent them interfering with crop germination. We hope to run a small trial where some edges are subsoiled and others are left alone, to compare the results on germination and crop growth.

One key concern is to manage the tree lines so that they do not over-shade the original headlands and create a tunnelling effect. We would prefer to see a combination of some shady spots and plenty of open sunny stretches where the trees are not too dominant.

Future Work:

Continued hedgerow restoration and pockets of woodland: Andrew's work on his hedgerows and adding pockets of trees into awkward corners is already showing benefits to the biodiversity on the farm; we'd be very happy to support further work of this kind.

Extension of the headland planting: We are really pleased with this model for Andrew's land and would be delighted to continue with this type of planting around further headlands on the farm if Andrew finds the system is working for him.

Tree lines and alleys: Having decided to leave out any tree lines across fields for the EIP planting, we will keep an open mind and if Andrew wants to revisit the idea later and would be delighted to support further planting work.

Project 3: Noel Duggan - Shanbally House, Norwood, Nenagh, Co. Tipperary.

Summary of agroforestry planting:

19,837 native trees planted to restore and extend tree cover on the farm. Planting work included adding mixed shelter belts, new lengths of hedgerow, small pockets of trees, filling gaps in existing tree lines and hedgerows and starting a new orchard with heritage apple trees.

Background & Introduction:

The Shanbally estate comprises 200 acres of mixed pasture and tillage land with extensive gardens, all under organic management. The main enterprises are an organic herb growing operation in the gardens and on some of the tillage, and growing of organic cereals out on the rest of the farm.

We began working with the Duggan Family at Shanbally during the autumn of 2021 when they made an application to our Trees on the Land project for farm tree planting support. They were hoping to restore and add to the tree cover on the farm with traditional hedgerows, shelter belts, tree lines and small pockets of woodland. This kind of planting is very much in line with the work we do with many farms each winter season through the Trees on the Land project.

We wanted to include a project (in the EIP) that would showcase traditional farm tree planting and tree cover restoration as a contrast to the more modern silvoarable agroforestry work (rows and grids of trees). We believe that if agroforestry in general is to be taken up on any scale by Irish farms, it must not neglect traditional tree cover systems which have their place in the wider agroforestry toolbox. Hedgerows, shelter belts and small areas of woodland provide an accessible start point for so many farms who are interested in agroforestry but perhaps not yet convinced about putting trees all across their most productive fields.

Screening for Appropriate Planting: A desk based screening and site surveys of habitats, general biodiversity and birds found no barriers to tree planting, bar leaving sensible margins to pre-existing features. Please see baseline data folder for survey details.

Protected Areas: There are no SACs or SPAs or other designations on or directly adjoining the planting site.

Sites and Monuments: There is a mound (Code TN021-061) in the north east corner of the house in the parkland. Planned planting would not interfere with this site.

Local Landscape: The land around Shanbally is gently rolling and mostly under pasture with hedgerows and occasional areas of forestry or pockets of older broadleaf woodland. The old 18th century parkland surrounding the main house and gardens is an important feature and planting plans would be in keeping with restoration of this park.

Phase 1 - Traditional farm tree cover planting with native trees:

The tree planting plans at Shanbally were very much led by the team there and what they hoped to achieve in terms of shelter, structure and extra diversity of habitat to support wildlife on the farm.

The planting work includes: Small pockets of mixed native trees and some trees in pure and mixed groups in unproductive corners with low value habitat. Hedgerow and tree line restoration planting along lines of existing trees (mostly sycamore and ash) that have grown up in places from unmanaged hedgerows. Two lengths of mixed shelter belt and an orchard of heritage apple trees.

This phase of planting amounted to just shy of 20,000 trees planted during the winters of 2021-22 and 2022-23.



Phase 1 - Planting completed at Shanbally House - showing shelter belts along the northern boundary and in the southernmost field. Orchard adjoining the walled garden. Polygons showing the three areas planted with small groups of trees, and several lines of hedgerow and treeline restoration.

Shelter belts: 920m approx. of shelter belts were planted. 680m along the northern boundary of the farm, consisting of four rows of trees at 2m staggered spacings and set with scots pine, oak, alder and some birch. A second length of 240m was set as a very dense belt of trees in several tight lines, roughly north south in the southernmost field. Many of these trees will be respaced and moved onto other areas of the farm over the coming seasons when they have grown on a little as they were very small on arrival.



The new shelterbelt along the northern boundary - almost invisible, but trees doing well.

Hedgerows and tree lines: 1,200m approx. of hedgerows and tree lines were planted at field boundaries, both as new lengths of hedging and filling gaps in existing patchy tree lines. Species include hawthorn, alder, blackthorn, oak, spindle, guelder rose, hazel and crab apple.



Tree Lines that have been augmented with hedgerow species set into the gaps.

Orchard: 80 heritage apple trees have been planted into a new orchard area next to the walled garden.

Pockets of native trees: Small groups of native trees, mostly oak and scots pine with birch and alder, were planted in three pockets of ground amounting to approx. 0.2Ha in total.



One of the areas planted with small groups of mixed native trees.

All of these trees were native trees, grown in Ireland from Irish provenance seed. We hope that this part of the EIP project will showcase the kind of farm tree planting that can be done to add and restore tree cover, using native trees, without the need to overcomplicate designs or species selection. These native trees are tough and well adapted to the climate and should cope well with the open and exposed location. All of the trees were planted by the Shanbally team, which was a huge undertaking and very efficiently carried out.

Trees Planted - Phase 1 - Shanbally House:

Alnus Glutinosa (Common Alder)	2,450
Prunus Spinosa (Blackthorn)	100
Betula Pubescens (Downy Birch)	768
Malus Sylvestris (Crab Apple)	277
Viburnum Opulus (Guelder Rose)	20
Corylus Avellana (Hazel)	130
Quercus Robur (Oak)	5,617
Pinus Sylvestris (Scots Pine)	5,010
Euonymus Europaeus (Spindle)	20
Crataegus Monogyna (Whitethorn)	5,365
Heritage Apple Trees	80
Total:	19,837

Tree Protection:

The trees planted at Shanbally are not protected. There was no need to fence them from livestock and we have let the grass and weeds grow up and shelter them. This means they are somewhat difficult to see and find in the undergrowth, but very well protected against exposure and drought.

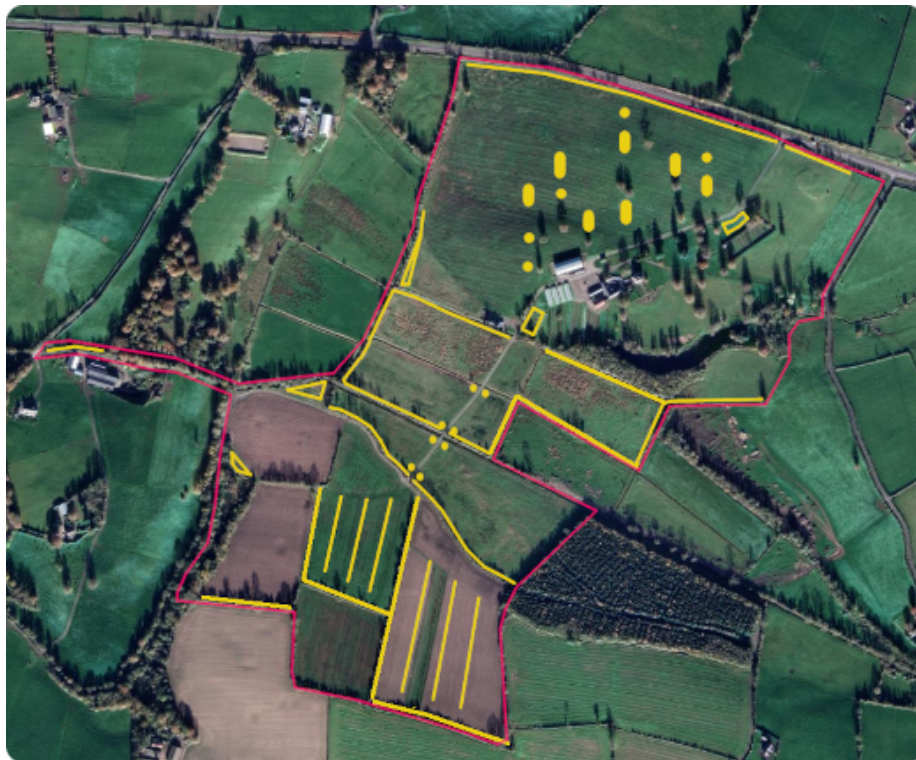
Modern tree planting leans heavily on tree guards and vegetation control to protect trees and reduce competition, however we have been working with minimal guarding and weeding systems through the Trees on the Land project for over a decade and find that trees do very well. Top growth during the

first two or three years is quite slow while the trees make use of ground shelter and put down strong roots to get below the roots of grasses and weeds and work through any hard pan in the soil. Once they reach nutrients deeper in the soil, they put on rapid top growth and start to shade out the grasses and weeds. We have absolute confidence in this system and will carry out some simple trampling of weeds this summer in order to take head counts and monitor progress.

Phase 2 - Future Planting - Adding further traditional tree cover with native trees; restoring the parkland; adding an alley system:

We have started to talk about further tree planting with the Shanbally team: The second phase of planting would add further native tree cover as hedgerows, linear woodlands and shelter belts at the farm boundaries and more pockets of trees in the corners of fields. We have also started draft designs for restoring the parkland and adding alley systems to some fields as the EIP project is closing.

The parkland has a number of aged trees, some describable as veteran trees which would be let alone as they are, with new planting set well away to give them plenty of space. The land is rotated between pasture and tillage and a new generation of parkland trees would be established, carefully positioned as individual open growing trees and small groups of trees, to facilitate ploughing and minimise any shading to crops. These trees would then double up as a silvopasture system when the land is under grass and grazed by livestock.



Map showing Phase 2 future planting added to Phase 1 - Lengths of hedgerow and tree lines; an alley system in the southernmost fields; small groups of trees at field corners and restoration of the parkland with trees set north south.

Species to be planted on the parkland could include oak, walnut, lime, cherry, elm (disease resistant), scots pine, sycamore and plane, set in pure and mixed groups with understoreys of hazel / cobnut, fruit trees and possibly soft fruits also which would provide useful harvests for the farm.

The shelter belt planted in phase one along the northern boundary could also be widened to provide more of a linear woodland with opportunities for timber trees and further productive fruit and nut trees in the understorey.

The tillage fields south of the river would lend themselves to an alley system; they are currently growing cereals and herbs in rows north south and adding tree lines of diverse fruiting and nut producing trees here would complement an already diverse system, providing shelter, additional diversity of habitat and produce for the farm. Noel is keen to look at truffle production and carefully sited inoculated trees would potentially work in these fields along headland margins.

Management:

The trees at Shanbally are doing well in their first year of establishment. We have made several visits to monitor progress and while there are some small areas and lengths with failures, the trees are establishing as we would expect.

Due to the exposed location, trees were not weeded or interfered with during the first growing season. Grasses and weeds have been allowed to grow up around them and shelter them from prevailing winds. This shelter was also important during the very dry summer of 2022 and the trees have survived well.

This summer 2023, we will carry out basic 'finding' and 'trampling' in the planted areas. This is slow work, finding each tree in amongst the grass and weed layer, trampling the vegetation around it and marking failures for restocking next winter. We will supply trees for restocking as they are required during the planting season. As the trees begin to establish and put on more rapid growth, we will advise and support Shanbally on further management work, pruning and thinning as needed.

Concluding Remarks:

We hope that these three projects will establish strongly and bring measurable benefits to each farm. We will support any additional tree planting as each farm wishes.

Farm walks and visits will be arranged for all of the sites over the next year and then at intervals as the trees settle in and begin to mature; we hope that they will provide a really useful demonstration for the tillage farming community in Ireland.

We aim to continue with data collection at 3 year intervals into the future to compare with the baseline work done so far.

Appendix I: Financial Report:

We secured €79,000 for this EIP project and have divided the costs into two broad categories:

1 - Administrative costs: Research and development, site surveys and baseline data gathering, design and planning work, communications and planning designs with farmers, outside consultancy costs, lab tests, report writing, mapping and other administration costs.

These costs are essentially the observational work of surveys and site visits and then the office and desk-type work of the design and communications needed to get the projects ready to go and keep records and reports up to date.

Application Estimated Costs: €17,000

Actual Project Costs: €51,583.86

2 - Practical costs of tree establishment: Ground preparation, marking up and laying out planting areas, tree purchase, planting labour, tree protection measures, weeding and follow up maintenance.

These costs include everything out on the ground at the planting sites, relating to the establishment of the trees once plans and designs are finalised.

Application Estimated Costs: €62,000

Actual Project Costs: €27,409.72

EIP Funding:	€79,000.00
Interest accrued at bank:	€3.62
Administrative Costs:	
Site visits, design, mapping, baseline data gathering	€26,637.41
Research trips & expenses	€4,002.82
Outside consultancy	€1,400.00
Lab work	€19,063.63
Admin & overheads	€490.04
Subtotal:	€51,583.86
Practical Costs:	
Tree purchase	€19,466.91
Ground prep & planting labour	€6,393.01
Tree protection	€1,549.80
Subtotal:	€27,409.72
Total Expenditure:	€79,003.62
Closing balance at bank:	€0.00

The administrative costs were greater than we anticipated.

A fair amount of this was the lab costs for the soil tests, in particular for the soil microbiology analysis which was much more expensive than expected. We felt this expense was justified as one of the key parts of the baseline data.

Costs for visits to the sites and design work were also greater than expected, but well worth the detail put into them to ensure that the farms were happy that plans were meeting their needs.

Conversely, the practical costs were less than expected.

The overall costs of getting the projects planted up were less than the original estimates. This was, in the main, because two of the three landowners did an awful lot of the planting work themselves, leaving us with minimal planting labour costs, and due to the lack of need for extensive ground preparation work or tree protection measures.

Appendix II:

Key Performance Indicators:

We used the following KPIs throughout the project and for reporting to DAFM on the progress of the EIP project.

Project Sites Identification: Complete - Three tillage farms willing to participate in the silvoarable establishment trials and to host farm walks and visits for stakeholders to learn about silvoarable agroforestry.

Surveys and Baseline Data Collection: Complete - For each of the three farms we collected the following data for the purposes of establishing baselines with which to compare future developments and impacts of the agroforestry work: Habitat surveys, general biodiversity surveys, bird surveys, soil desk studies, soil profile analysis, earthworm counts, soil nutrient and organic matter tests, soil carbon analysis, soil biodiversity analysis.

Notes:

Some of our soil samples for the baseline data are still with the labs due to delays in processing. These will be returned to us in due course and we will add the results to the project write up when they arrive.

Agroforestry Designs and Planning: Complete - Design consultation and planning for the agroforestry establishment has been completed for the three farm sites.

Tree Sourcing, Ground Preparation and Planting Work: Complete - The planned tree planting to be carried out for the three farms has been completed. We will continue to work on the establishment phase of the project through the next few years to ensure successful ongoing establishment of the trees.

Preparations for Farm Walks and Visits: Complete - We have plans in place for farm walks to be held over the coming years. We held the first walk for Project 1 at Laurel Lodge, kindly hosted by Jack Browne and in collaboration with the Irish Agroforestry Forum during June 2022. We are arranging walks for the other two projects over the coming year and we will make a return visit to Project 1 this summer or next. We look forward to hosting regular walks and events at the three sites for farmers and other stakeholders to visit and learn about the projects.

Appendix III:

The EIP Project Team:

Trees on the Land

Trees on the Land is a cross-border initiative working to establish young native trees across the 32 counties of the Republic of Ireland and Northern Ireland. The project works with farmers,

smallholders, community groups, councils, schools, colleges, sports clubs and many other landowners to coordinate sites to accommodate trees. We plant small woodlands, orchards, hedgerows, shelter belts, coppice, wood-pasture, agroforestry, individual trees, rows and avenues of trees, landscape and amenity trees, reforestation sites and larger woodlands.

Imogen Rabone

Imogen has broad experience coordinating and producing large scale tree planting projects and establishing tree cover, woodland and agroforestry in Ireland and the UK. She has a particular interest in open grown trees and wood-pasture.

Mark Donnelly

Mark is an experienced forester and ecologist with wide experience working with Irish and UK forestry, native woodland and agroforestry. Mark is passionate about biodiversity and restoring tree cover on farms; he has travelled the world studying agroforestry of all kinds and brings great experience in agroforestry design to the team.

Brian Gaynor

Brian is a landscape architect and conservation officer. Brian (alongside Réamaí) has developed and delivered landscape scale farm resilience projects in the Glens of Antrim, South Ulster and for several farm estates belonging to the National Trust in Antrim and Derry.

Réamaí Mathers

Réamaí is a farmer and biologist with qualifications in environmental, earth sciences and a long experience of managing and delivering large landscape scale farmer and community planning projects. He has silvopasture agroforestry on his farm in Co. Antrim.

Appendix IV:

Farm Agreements:

We have made the following agreement with each of the three landowners:

Trees *on the* Land

Green Economy Foundation
Manch Estate, Ballineen, Co. Cork
www.treesontheland.com

Landowners Agreement for Trees on the Land EIP Project.

A Practical Silvoarable Demonstration and Research Project for Ireland.

Showcasing the benefits for biodiversity, carbon sequestration, soils, nutrient cycling, water quality, farm productivity and income, and the farming community.

This Silvoarable Demonstration & Research Project is an EIP (European Innovation Partnership) project administered by Trees *on the* Land. The Project is funded by the EU Recovery Instrument Funding under the Rural Development Programme 2014-2022



An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine



The European Agricultural Fund
for Rural Development: Europe
investing in rural areas

Introduction:

This agreement is designed to cover arrangements made for the planting and long-term accommodation of agroforestry tree cover on your land as part of the EIP project as titled above.

Trees on the Land has been awarded funding by DAFM (Department of Agriculture, Food and the Marine) to carry out this EIP (European Innovation Partnership) project (the project). The funding is provided by the EU Recovery Instrument Funding under the Rural Development Programme.

The agreement outlined in these notes is between you (the landowner) and the Green Economy Foundation Trees on the Land EIP project (we/us) and regards the permission, planning, preparation, planting, baseline data collection, ongoing monitoring and practical management of the trees as well as future farm walks and visits by stakeholders.

The Relationship:

This project has been undertaken as a partnership between you (the landowner) and the Trees on the Land EIP project.

Simply put, the intention is to work with you to establish a silvoarable agroforestry demonstration project on your land along with the collection of baseline data. The aim is to see the trees fully and successfully established and then to continue to collect further data as the trees begin to mature. In addition, the project is designed as a demonstration so that in future, farmers and other relevant stakeholders can visit and view the project to learn more about silvoarable agroforestry.

The EIP project includes and covers the costs of planning, design and preparation for planting, the purchase and planting of the trees, support with ongoing maintenance and management of the trees, data collection and arrangement of farm walks.

Trees on the Land is acting as coordinator, producer and facilitator for the project and is your first point of contact in all situations regarding the trees and the planting project in general. Our aim is to provide you with a friendly and practical service, and to give advice and support in all matters regarding the trees and the project in general.

The EIP project itself will run from July 2021 to May 2023. This period will cover the development and design, planting and establishment of the trees and the baseline data collection. After this time Trees on the Land will undertake to continue with the project with further data collection, close monitoring of the trees and their establishment, restocking of failed trees as needed, further tree

planting as the projects evolve, giving advice and support with management, and arranging farm visits for other farmers and stakeholders.

The Agreement:

The General Project:

You are giving permission for Trees on the Land to work with you to plant and establish tree-cover on your land.

You are giving permission for the Trees on the Land team to arrange to visit you to discuss plans and designs, to carry out surveys and data collection, to offer and give support with help for planting, weeding, formative pruning, fencing, guarding, restocking failed trees, monitoring establishment progress, and organising occasional visits for farmers and stakeholders.

Ownership:

The trees will become your property at the point of planting along with all fruits, nuts, timber, wood, cut foliage and other products and materials and any associated incomes or profits derived from them. Trees on the Land and the EIP / DAFM groups make no claim of ownership of the trees or of the land on which they will grow and claim no right of access beyond keeping to the spirit of this agreement in matters of monitoring and maintaining the trees to ensure successful establishment and good health over the longer term.

Permanent Tree Cover:

The trees planted are intended to become a permanent feature of the landscape on your land. Some trees will require selective thinning to promote other better trees in the planting systems, some trees will be selected and harvested as a regular or final crop, some trees will be coppiced or pollarded on a regular cycle, and some trees may be requested to be felled and or dug up for research purposes. We encourage and support the practical and sustainable use of the resources in these and any other reasonable ways.

Removal of Tree Cover:

Due to the experimental nature of much of the planting work, it may happen that the trees fail to establish and thrive, or that they become a hindrance to or have adverse impacts on your farming operations, or that they cause a reduction to the value of your land. We will of course do all we can to ensure designs are practical and fit for purpose and that the trees are a useful and beneficial addition to your farm. However, if you feel that you need to look at options for removing some or all of the trees permanently from your land, we will work with you to support this and see that it is done in a correct manner including support in applications for felling and harvesting licenses etc as needed. We hope that if this does happen, we will be able to collect any useful data and reasons for removing the tree cover so that we and other stakeholders may learn from the experience to help inform other agroforestry projects.

Monitoring and Visits:

Trees on the Land will stay in close contact and make occasional visits to you to monitor progress, and to advise and support with management work while the trees are in the crucial early stages of establishment. We will continue to arrange visits for monitoring, data collection and advisory purposes and to give support with management work. We will never visit without having made a prior appointment with you. You are agreeing to facilitate these visits and to provide feedback and any observations you make on the trees and the project in general to us.

Failures and Restocking:

Any failed trees will be restocked during the following winter planting season for the first five years or so after planting. It may be that certain species or varieties of trees fail and are better replaced with other alternatives. We will discuss choices of replacement trees with you during visits.

Management and Maintenance:

As the landowner you are agreeing to undertake basic regular maintenance of the trees planted including weeding, mowing of paths, basic observation of survival rates and maintenance of fencing and access to the planted areas as appropriate and in line with basic groundskeeping work.

We do not expect all areas of planted trees to be perfectly weeded or mown, indeed in many cases trees standing on exposed tillage land will be better off sheltered by weeds, grasses or other cover crops which will help them to preserve local humidity and reduce transpiration in dry conditions. An annual check during the main growing season, to see that the trees are alive and well amongst other vegetation, with trampling of very strong weed growth is quite sufficient. We do not advocate spraying with any herbicides and we ask that care is taken with any mowing or strimming close to the trees, so that they are not damaged.

If you are struggling with weeding and monitoring of trees, please ask and we will gladly help and arrange support alongside our occasional visits to check on the trees.

When the trees require more detailed work: coppicing, thinning, pollarding, pruning and later selective felling and harvesting, you are agreeing to keep Trees on the Land informed on this work and to ensure that the trees are managed sustainably as part of a continuous cover system so that permanent tree cover is maintained in the planted areas as far as possible.

Trees on the Land are committed to giving you support to effectively and sustainably manage the trees planted. We are an approachable and knowledgeable team and we are here to help in any way we can throughout the establishment phase and beyond.

Further Tree Planting:

There may be scope for further tree planting in addition to that done during the first establishment phase of the project. Whether making adjustments and extensions to the planting or whether you feel there is scope to do more new planting on other areas of land, we will be delighted to support more planting work and to continue to evolve and extend designs to suit your plans for the farm.

Data Collection:

We aim to collect baseline data during the early part of the project to establish a start point of conditions for the project before the trees have any impact on the planting site. We aim then to continue with collection of data in future years to keep track of any changes as the project develops.

This data includes, inter alia, carrying out ecological surveys, habitat surveys, bird surveys, other biodiversity surveys, soil surveys and profile analyses, earthworm counts, soil nutrient analyses, soil carbon tests, soil biodiversity tests, water quality tests, tree and vegetation carbon tests, tree growth monitoring, harvesting and income records for fruit, nuts, foliage, wood, timber and other materials, records of tillage crop performance in and around the trees.

You are agreeing to facilitate visits for data collection purposes. We will never visit without making an appointment with you first.

Funding, Forestry and Farm Payments:

There are many different ways to design and implement agroforestry and there are many different pathways to funding its establishment and maintenance - these all have impacts on how the land is described and designated.

We have not given you any sort of payment to take part in the project. Your new agroforestry tree cover should not impact on or conflict with your basic farm payments in any way and it should not result in your land being redescribed or designated as forestry. Your land is working agricultural tillage land and should be expected to be described as such. If you should find any issues or misunderstandings with your farm payments or land use designations, please don't hesitate to contact us for support in helping to dispel any confusion. Sometimes tree cover can look very different on a satellite view to that seen on the ground, especially as tree canopies begin to mature.

You may find that your new tree cover is beneficial to you in helping to fulfil requirements for farm eco-schemes or sustainable farming initiatives. We are delighted if this is the case and encourage you to take advantage of any such benefits if they arise.

Farm Walks and Visits:

You are agreeing to facilitate farm walks and visits. We hope that this project will create useful demonstrations of different types of silvoarable agroforestry. We will arrange farm visits and walks to each of the projects for other farmers and stakeholders to look at and learn from these demonstration projects. In general we would aim to arrange walks during the summer months when the leaves are on the trees and the weather and ground conditions are good. We would not expect to arrange more than one walk a year and one in several years is more likely. All visits and farm walks will be arranged with you in advance and to fit dates that are convenient to you. We will ensure that, as much as possible, the organisation and coordination work, and hosting / guiding if necessary, is done on our side to keep interruption and upheaval to a minimum.

If at any point you require advice or practical help with the trees, please do not hesitate to contact us and we will arrange to visit and or talk through the situation with you in detail.

Please contact Imogen Rabone - Tel: +44 7555 605 333 - Email: imogen@treesontheland.com

I/We understand and agree to follow the conditions and guidelines outlined in this agreement:

Landowner:

Landowner full name:

Address of tree planting site:

Date:

Signature:

Trees on the Land:

Date:

Signature:

Name and Position: